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Journal of the Society of Arts.

FRIDAY, DECEMBER 5, 1862.

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NOTICE TO MEMBERS AND INSTITUTIONS.

Exhibition Catalogues.

Her Majesty's Commissioners for the International Exhibition of 1862 have placed at the disposal of the Council, for distribution to the Members of the Society and Members of the Institutions in Union, copies of the Industrial and Fine Art Catalogues.

Members of the Society desiring to have copies of each of these Catalogues may have them on application, either personally or by an authorised agent, at the Society's House.

Secretaries of Institutions in Union may have a limited number of copies placed at their disposal for distribution amongst their Members, on making a similar application.

General Index.

A general Index to the first ten volumes of the *Journal* will shortly be published, which may be bound with the last volume. Members who desire to have copies (which will be supplied *gratis*) are requested to apply to the Secretary as early as possible, in order that a sufficient number may be printed.

EXAMINATIONS, 1863. — NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards is specially called to the following extract from the programme of examinations for 1863 :—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

THIRD ORDINARY MEETING.

Wednesday, December 3, 1862.

The Third Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 3rd inst., Rear-Admiral Sir Edward Belcher in the chair.

The following candidates were proposed for election as members of the Society :—

Attenborough, Richard	Whitley Grove, Reading.
Aubin, Charles	Guardian Works, Great Hampton-street, Wolverhampton.
Baylis, W. H.	69 Judd-street, Brunswick-square, W.C.
Bickley, William	7 Ludgate-street, E.C.
Birnstingl, Louis	230 Regent-street, W.
Bowron, James	Tees Glass Works, Stockton-on-Tees.
Boyd, James	91 New Bond-street, W.
Bradshaw, William	Meadow Iron Works, Mansfield.
Brockwell, Frederic H.	79 & 80 Leather-lane, E.C.
Cochrane, Adam L.	Galashiels, N.B.
Dix, Thomas	10 Amwell-street, Claremont-square, E.C.
Ebrall, Samuel	Canonbury-house, Kingsland, Shropshire.
Fraser, Edward John	26 Craven-st., Strand, W.C.
Frederickson, Johan Frederick	27 Finchley-road, St. John's Wood, N.W.
Godfrey, Edmond	30, Brewer-st., Golden sq. W.
Green, James	35, Upper Thames-st., E.C.
Hack, Thomas	West Middlesex Waterworks, Hammersmith.
Hammer, George M.	44, Harrington-street, Hampstead-road, N.W.
Hook, Charles Townsend	Snodland, Kent.
Hudson, Alfred	Cranbrook.
Johnson, Jabez	Pennington Hall, near Manchester.
McLaren, David S.	13, Bute-st., Brompton, S.W.
Scarth, John	96, Westbourne-terrace, W.
Warne, Stannard	4, Bruton-street, Bond-st., W.
Warrington, Wm. jun.	35, Connaught-terrace, W.

The following Candidates were balloted for and duly elected members of the Society :—

Abbott, Maj.-Gen. Sir Frederick, C.B.	73, Inverness-terrace, Kensington-gardens, W.
Ackland, William	121, 122, and 123, Newgate-st., E.C.; and 19, Church-row, Newington Butts, S.
Ainsworth, Samuel	(James Carter and Co.), High Holborn, W.C.
Aldebert, Isaac	57, Long-acre, W.C.
Allan, Alexander	Locomotive Department, Scottish Central Railway, Perth.
Allan, John	2 and 3, St. Paul's Churchyard, E.C.
Allen, Henry	17, Percy-street, Bedford-square, W.C.
Andrew, Fred. Wm.	3, Neville-terrace, Queen's Elm, S.W.
Ashworth, Taylor	The Grove, Hanley, Staffordshire.
Atkinson, J. Beavington	Rosehill, Cotham-park, near Bristol.
Atkinson, Richard	31, College-green, Dublin.
Austin, James	8 and 9, Princes-street, Finsbury, E.C.
Baiss, William Arnold	Denmark-hill, S.
Baldock, William	Grove-cottage, Putney, S.W.
Barron, E. C.	The Lodge, Chingford, Essex.
Barron, W. J.	The Lodge, Chingford, Essex.
Barry, Dykes	4, Buckland-crescent, Belsize-park, St. John's-wood, N.W.
Barry, John George	Meriton's Wharf, S.E.
Barry, Sir Redmond	Carlton-gardens, Melbourne, Victoria.
Bedford, Francis	23, Rochester-road, Camden New-town, N.W.
Bell, Thomas	Broadway-house, Plaistow, E.

Benson, James William	33 and 34, Ludgate-hill, E.C.
Betts, Rev. Robert Wye	Lyndhurst-road, Peckham, S.
Bevan, Henry	St. Mary's-street, Shrewsbury.
Birrell, George	Dunfermline, N.B.
Bolckow, Henry	Marton-hall, Middlesbro'-on-Tees.
Booth, H. C.	Harrogate.
Borwick, George	21, Little Moorfields, E.C.
Bradbury, Thomas	Longroyde, Brighouse.
Bradbury, William	40, St. John's-park-villas, Haverstock-hill, N.W.
Brady, George	Winchelsea-lodge, near Ilford.
Brassey, Thomas, jun.	Beaufort, Battle, Sussex; and University Club, Suffolk-street, S.W.
Bretnall, T. D.	24, Huntley-street, Tottenham-court-road, W.C.
Brooks, S. A.	10, Northampton-square, E.C.
Broomhall, J.	Manor-st., Old Kent-rd., S.E.
Brothers, A.	14, St. Anne's-sq., Manchester.
Buchwald, Joseph Children	12, Old Quebec-street, W.
Burgoyne, Gen. Sir John Fox, Bt., G.C.B., F.R.S.	8, Glo'ster-gardens, Paddington, W.
Caslon, Henry William	22, Chiswell-street, E.C.
Clark, Gordon Wyatt	72, Great Tower-st., E.C.; & Chessington, Surrey, S.W.
Clarkson, Thos. Charles	56, Stamford-street, S.
Clarkson, Wm. Watts	Narborough-road, Leicester.
Coathupe, Captain H. B.	1, Abingdon-terrace, Kensington, W.
Cole, James Ferguson	11, Great James-street, Bedford-row, W.C.
Collins, Hyman Henry	61, Torrington-square, W.C.
Cooper, Miss Adeline M.	78, Coleshill-street, Eaton-square, S.W.
Cooper, William	40, Brompton-row, S.W.
Cope, Walter	17, Terrace, Camberwell, S.
Cowan, Thomas William	Kent Iron Works, Bridge-street, Greenwich, S.E.
Curzon, Hon. Robert	24, Arlington-street, S.W.
Dawson, A.	Kingston-on-Thames, S.W.
De la Grangerie, Chevalier Dardenne	Rue Chalot, 76, Paris.
De L'Isle, Lord	Penshurst, Kent; and Ingleby Manor, Northallerton, Yorkshire.
Denman, Lord	28, Sackville-street, W.; and Middleton, Sheffield.
Dickes, William	Clarendon-villas, Loughborough-park, Brixton, S.
Dobson, Christopher Terry	13, Foxley-road, North Brixton, S.
Doubleday, H.	Coggeshall.
Dowleans, A. M.	Malvern-villa, Eldon-road, Victoria-road, Kensington, W.
Duncan, Charles Stewart	39, Inverness-road, Bayswater
Duncum, Chas.	17, Wigmore-street, W.
Dunville, William	Richmond-lodge, Belfast.
Earp, Thomas	1, Kennington-road (near Female Orphan Asylum), Lambeth, S.
Eastham, John	Moorfield-villa, Halifax.
Eddy, C. W.	8, Warwick-terrace, Belgrave-road, S.W.
Edmunds, Thomas Herbert	29, St. George's-square, Regent's-park, N.W.
Edwards, Richard	Dale-hall, Burslem, Staffordshire.
Ellis, Charles	21, Bedford-street, Covent-garden, W.C.
Ernst, F. Gustav	19, Calthorpe-street, W.C.
Evrard, Jean	35, Charles-street, Middlesex Hospital, W.
Falcke, David	Sutherland-house, Great Yarmouth.
Fetherston, John J.	18, Suffolk-street, Dublin.
Fryer, Henry	1 and 2, Gray's-inn-place, Gray's-inn, W.C.
Foley, Lord	26, Grosvenor-square, W.; and Worksop Manor, Nottinghamshire.
Forster, John	Denmark-hill, S.
Forsyth, James	8, Edward-street, Hampstead-road, N.W.
Foveaux, Joseph Franz	62, Strand, W.C.
Geeves, William	Caledonian Sawing and Planing Mills, New Wharf-road, Caledonian-road, N.
George, Francis	5, Sise-lane, E.C.
Ghislin, Thomas Goulston	72, Hatton-garden, E.C.
Gisborne, F. N.	3, Adelaide-place, London-bridge, E.C.
Goding, Charles	13, St. George's-place, Hyde-park-corner, S.W.
Goding, William	13, St. George's-place, Hyde-park-corner, S.W.
Gonzaga, H. S. H. the Prince of, and Duke of Mantua	11, Charles-street, Manchester-square, W.
Goodall, Josiah	12, Great College street, Camden-town, N.W.
Grant, George	National Boat-building Company, 123, Fenchurch-st., E.C.
Gresley, Sir Thomas, Bart.	Cauldwell-hall, Burton-on-Trent.
Guillaume, Charles	16, Myddelton-square, E.C.
Hall, Charles Godfrey	89, Quadrant, Regent-street, W.
Hamilton, Capt. Henry George, R.N.	71, Eccleston-square, S.W.
Hancock, Henry	37, Harley-street, W.
Harnett, William	12, Panton-square, Coventry-street, W.
Harvest, D.	Dowgate Dock, Upper Thames-street, E.C.
Harvey, Alexander	Govanhaugh, Glasgow, N.B.
Headland, Edward	6, Upper Portland-place, W.
Heath, Robert	25, St. George's-place, Hyde-park corner, S.W.
Heathorn, Captain Thos. Bridge	Royal Artillery Barracks, Sheerness.
Herdman, William G.	West Villa, Everton, Liverpool.
Heywood, Edwin	Halifax.
Higgs, Samuel, jun.	Penzance.
Hill, Lord A. Edwin, M.P.	24, Belgrave-square, S.W.
Hodgkinson, Francis O.	161, New Bond-street, W.
Honeyman, Rev. D., F.G.S.	Nova Scotia.
Horwood, H. J.	36, Albert-street, Regent's park, N.W.
Howard, Thomas	King and Queen Iron Works, Rotherhithe, S.E.
Hutchins, William	8, Croom's-hill, Greenwich, S.E.
Jackson, Samuel	Bradford.
Jecks, Isaac	Great Yarmouth.
Jeffrey, John	61, Charlotte-street, Portland-place, W.
Johnson, Colonel B. P.	Corresponding Secretary, New York State Agricultural Society, Albany, New York, U.S. America.
Johnston, James	Newmill, Elgin, N.B.
Keeling, Herbert Howard	King and Queen Iron Works, Rotherhithe, S.E.
Kershaw, William	Suffolk-lodge, Brixton-road, S.; and 16, St. Mary Axe, E.C.

Key, John	White Bank Engine Works, Kirkcaldy, N.B.
Kindon, Charles	Swan-street, Old Kent-road, S.E.
Knott, J. H.	Prospect-cottages, Roehampton, S.W.
Kullberg, Victor	12, Cloudesley-terrace, Islington, N.
Land, John	94, Cannon-street, E.C.
Langdale, E. F.	72, Hatton-garden, E.C.
Lazard, Edward	46, Gloucester-crescent, Hyde-park, W.; and 11, Moorgate-street, E.C.
Lea, Charles James	High-street, Lutterworth.
Leak, Abraham	132, Piccadilly, W.
Legg, Thomas Rowland	11, Croom's-hill, Greenwich, S.E.
Lenthall, Henry	222, Regent-street, W.
Letchford, R.	Three Colts-lane, Bethnal-green, N.E.
Lillicrapp, W. P.	19A, Davies-street, Berkeley-square, W.
Litchfield, Samuel	19, Green-street, Leicester-square, W.C.
Longbottom, John, Jun.	Osmondthorpe-hall, Leeds.
Lovegrove, James, C.E.	Pembury-lodge, Dalston-rise, N.E.
Lutley, James	Queen's-road, Brighton.
Maclean, T. M.	26, Haymarket, S.W.
Mann, Aldridge	122, Holborn-hill, E.C.
Marsden, W. J.	Upper Thorpe-road, Sheffield.
Martin, Thomas	22, Stock Orchard-villas, Caledonian-road, N.
Martin, W. A., C.E.	55, Great Sutton-street, E.C.
May, Harry	9, Gloucester-grove West, Brompton, S.W.
McCallum, D.	1, Octagon, Union-road, Plymouth.
McClure, Andrew	Walbrook, E.C.; & 14, Ladbroke-sq., Notting-hill, W.
McLennan, J.	6, Park-place, Highbury, N.
Miller, John	Sandland's Chemical Works, Aberdeen.
Moffat, Major A. Hay	65, Porchester-terrace, W.
Molineux, Thomas	37, John Dalton street, Manchester
Morewood, Edmund	Stratford, E.
Newth, Frederick	44, Percival street, Clerkenwell, E.C.
Nicholls, Henry	52, Regent-street, W.
Northcott, Edward	13, Rood-lane, E.C.
Odling, Anselm	6, Prince's place, Kennington-road, S.
Oram, George	19, Wilmington-square, E.C.
Ormson, Henry	Stanley-bridge, King's-road West, S.W.
Oswald, Alexander Haldam	58, Green-street, Grosvenor-square, W.
Paine, Mrs.	Farnham.
Parkhurst, Rodie	7, Clarendon-terrace, Lewisham-road, S.E.
Partridge, Ebenezer	Whinfield Works, Smethwick.
Philp, Andrew Bell	10, Paradise-row, Stoke Newington, N.
Pooley, Henry, C.E.	Albion Foundry, Liverpool.
Power, Bonamy	19, Chesham-street, S.W.
Powis, Earl of, D.C.L.	45, Berkeley-square, W.; and Powis Castle, Welchpool.
Pugh, Edward	Bilston.
Pulham, James	Broxbourne, Herts.
Purling, Charles	150, Marylebone-road, N.W.
Ranwell, John Percival	1, Middleton-place, Stoke Newington-road, N.
Reed, William	5, Sumner-place, Onslow-square, S.W.
Revell, James	267 & 272, Oxford-street, W.
Ridley, Arthur S.	54, Gloucester-road, Regent's-park, N.W.
Robertson, Archibald	67, Gracechurch-street, E.C.
Robinson, John	Rochdale.
Rosher, F.	72, Mornington-road, Regent's park, N.W.
Rosher, George	54, Oakley-square, N.W.
Roupell, Robt. P., Q.C.	13, Park-lane, Piccadilly, W.
Rumsey, W. S.	Derby-house, Clapham-rise, S.
Russell, Captain Godfrey	103, Albany-street, Regent's-park, N.W.
Russell, John	Risca-house, near Newport, Monmouthshire.
St. George, Brigadier-General, J.	17, Rutland-gate, S.W.
Sambrooke, Thomas	32, Eaton-place, S.W.
Samuelson, Martin	Scott-street Foundry, Hull.
Sax, Julius	8, Hatton-garden, E.C.
Schooling, Henry	2, Parkfield-villas, King Edward-road, Hackney, N.E.
Scudamore, Frank Ives	Conduit-vale House, Blackheath, S.E.
Seaton, W.	44, Albemarle-street, W.
Sharman, Alfred	Mulberry-villa, Walham-green, W.
Skinner, H.	25, Coleman-street, E.C.
Smith, Henry	21, Duke-street, Edinburgh.
Smith, Robert	23, Fish-street-hill, E.C.
Spink, Daniel	Pyleigh, Bridgewater
Stanley, W. F.	3 & 5, Great Turnstile, Holborn, W.C.
Stevens, John Robert	8, Delamere-terrace, Maida-hill, W.
Stodart, Mrs. Matilda	31, Cloudesley-terrace, Islington, N.
Stubbs, William	10, Elliott-street, Liverpool.
Sutton, Martin Hope, F.R.H.S.	Cintra-lodge, Reading.
Thompson, Joseph	Beach-grove, Bowden.
Thompson, Nathan	National Boat-building Company, 123, Fenchurch-st., E.C.
Truscott, Francis Wyatt	5, Suffolk-lane, Cannon-st., E.C.
Tueski Moritz Paul	King's Lynn, Norfolk.
Turner, W. Shearman	55, Old Broad-street, E.C.
Turney, J. G.	Shirley-villa, South Norwood, S.
Twelvetrees, Harper	Bromley, Middlesex, E.
Tyler, James W.	4, Wood street, Westminster, S.W.
Ullmer, Frederick	15, Old Bailey, E.C.
Usher, Rufus	Bodicott, Banbury.
Vickers, James	Woodlands, Tooting Common, S.
Vines, Richard	3, Great College-street, Camden Town, N.W.
Vogan, James	Mill Wharf, Mill-street, Bermondsey, S.E.
Ward, William A.	3, Belgrave-villas, Barrington road, Brixton, S.
Watney, James, Jun.	10, Oxford-square, W.
Watts, Henry	31, Wellington-road, Stoke Newington, N.
Welton, Thomas	13, Grafton-street, Fitzroy-square, W.
Wesley, Matthias Erasmus	36, Great George-street, S.W.
Westley, Frederick Wm.	10, Friar-street, Doctor's-commons, E.C.
White, Frederick Meadows	5, Brick court, Temple, E.C.
White, George	Abbey-street Schools, N.E.
Whitehead, William	203, Western Bank, Sheffield.
Whitelaw, John	St. Clement's Wells, Musselburgh, N.B.
Whitmee, John, Jun.	70, St. John-street, E.C.

Widnell, Henry . .	Lasswade, near Edinburgh.
Wilford, John . .	Brompton, near Northallerton, Yorkshire.
Williams, W. E. . .	High-st., Wandsworth, S.W.
Wilson, Isaac Whitwell .	Castle-lodge, Kendal.
Wilson, William . .	Fairbank-villa, Talfourd-road, Camberwell, S.
Young, William Martin .	Warwick-crescent, Harrow-road, W.
Zaehnsdorf, Joseph .	30, Brydges-street, Covent garden, W. C.

And as Honorary Corresponding Members.

Altgelt, Regierungs-Rath A.	Prussian Commissioner for the International Exhibition of 1862.
Beeg, Dr. C. . . .	Bavarian do.
D'Azeglio, His Excellency the Marquis. . .	Ambassador for Italy.
Del Campo, J. M. . .	Secretary of the Dutch Commission for the International Exhibition of 1862.
Devincenzi, Commendatore G., M.P. . .	Italian Commissioner for do.
Di Cavour, Marchese G. B., M.P. . .	Do do. do.
Dietz, Dr. . . .	Commissioner from Baden for do.
Fortamps, Senator F. .	Belgian Commissioner do.
Hoene, Geheimer-Ober-Regierungs-Rath. .	Prussian do.
Karmarsch, Dr. C.. .	Hanoverian do.
Koch, Herr . .	Secretary of Ministry of Commerce, Berlin.
Peterson, George . .	Russian Commissioner for the International Exhibition of 1862.
Sannicola, Le Chevalier Docteur Giovanni .	Naples.
Tidemand, Emil . .	Norwegian Commissioner for the International Exhibition of 1862.
Villa Maior, Le Visct. de	Portuguese do.
Von Steinbeis, Dr. . .	Commissioner for Wurtemberg for do.
Waern, C. F. . .	Swedish Commissioner for do.
Wiessner, Regierungs-Rath M. L.	Saxon do.

The following Institution has been received into Union since the last announcement:—

Redhill, Town-hall Literary and Scientific Institution.

The Paper read was—

ON BOAT-BUILDING BY MACHINERY.

By D. Puseley.

If, instead of being at the meeting of a scientific Society, you had just taken your seats at a well-furnished dinner-table, the momentary attention attracted by the servants while uncovering the repast, would be at once eclipsed by the attraction of the repast itself. Be it so on the present occasion. I am simply a waiter or attendant at the scientific entertainment to which you have been invited. And while I shall endeavour, to the best of my ability, to place the fare before you in a lucid but unadorned manner, the only thing I could desire to win from you in return would be the simple assurance that, instead of attempting anything beyond my own humble capacity, I have—like a modest waiter—confined myself to the duties of my situation.

Although indisposition has for some time past prevented me from appearing on a public platform, I have this evening undertaken to introduce a subject which might not otherwise have been brought before this Society. The parent of the invention on which the theme is founded declares that he could not speak of his own work unless you were at his factory, and that if you were there he would have no occasion to speak, inasmuch as his machines would speak for themselves. But at the close of my addresss, I will, should you desire it, furnish you with a key by which you may discover that, if my friend cannot speak boldly, he can at least speak as much to the purpose as anybody else.

My own task this evening is an easy one. I have no longer to dwell on the difficulties in the way of the inventor, and those who assisted him, in introducing his invention to the public. Beyond the inventor and myself no human being will ever know the extent of those trials. But I have simply to speak of what is now, so far as public recognition is concerned, an accomplished fact. And though it will be impossible to convey to you more than a faint idea of the wonderful power of Mr. Thompson's machines, a few words on the subject may induce some of you to visit the factory and judge for yourselves. Sceptical gentlemen (if there are any) may then become converts, like the Lords of the Admiralty, one of whom, at the close of the mechanical exposition, exclaimed, "I believe machinery capable of anything but diplomacy."

If, then, the new system for boat-building by machinery is a mechanical novelty of public interest, it must be doubly interesting at the present moment, inasmuch as the system itself, which has hitherto only received a partial or sectional illustration by a few skilful workmen, is on the eve of being worked in its entirety by a full and (what time and practice, it is to be hoped, may make) an efficient staff. Anything is of course a theory that has not received a practical solution. The new system for boat-building by machinery is about to be put on its trial. The National Company—by whom the patents for this country have been secured—will shortly have in full, in not in perfect operation, the entire series of machines to which, by the aid of models and specimen. of manufacture, I am now going to direct your attentions Although I have not the honour to be, in any way, connected with the Company in question, I may venture to repeat (what has often been predicted by some of the most eminent scientific men of the day) that the said Company, by the introduction of machinery into an important branch of naval architecture, will furnish another striking proof that the slow process of manufacture by manual labour is no match for steam-power and the scientific improvements of the nineteenth century. And, so far as the present subject is concerned, the assumption is materially strengthened by the fact that two of the most extensive and eminent boat-builders of the day—the Messrs. Forrestt—are managers to the company by whom boats built by machinery are about to be introduced to the world at large.

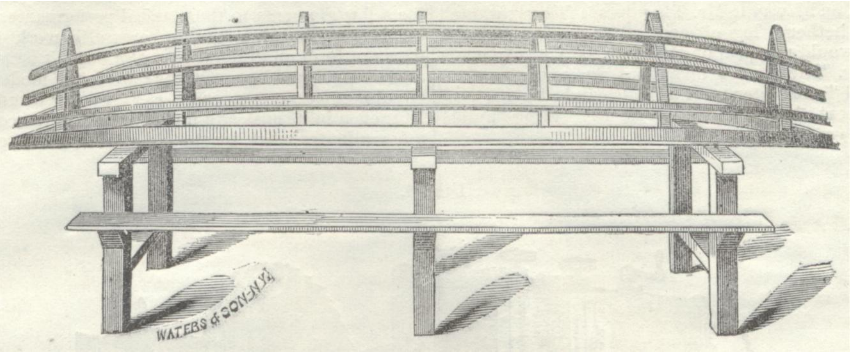
The splendid fleet of boats that have been built for one of the first and most philanthropic Societies in the kingdom—I mean the Royal National Life Boat Institution—prove at least that the Messrs. Forrestt were first-class boat builders under the old system. But, finding that they could not compete with machinery, these gentlemen are now the captains or pioneers by whom the new system is to be introduced.

As Mr. Thompson, the inventor of this system, is himself present, together with many other gentlemen who are better qualified to discuss this subject than one who has no pretension to mechanical skill, I will, as a simple preface to discussion, inquiry, and explanation, proceed to illustrate, as briefly as possible, the various sections of the invention by the combination of which the grand result is accomplished.

Here is the model of an Assembling Form (Fig. 1, see next page):—

Assembling forms, like boats, are of various shapes and sizes. Like the foundation of any other structure, the assembling form in the new system of

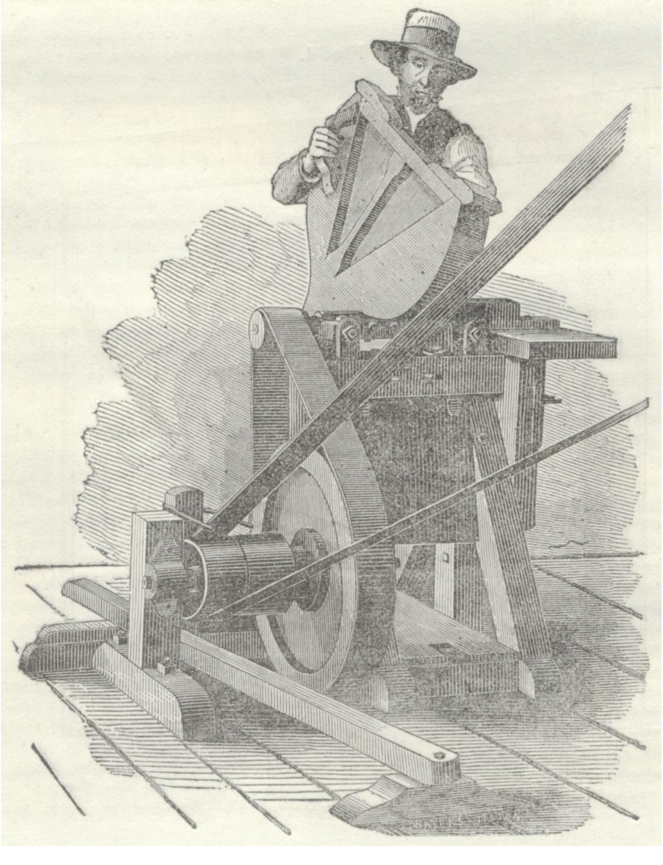
Fig. 1.


WATERS & SON-N.Y.

boat building is the groundwork on which the entire superstructure is raised. While the machines are the mechanical workmen by which all parts of a boat are cut to pattern, or regulated by index to the exact size required, each part fits with the same mechanical accuracy in its allotted space on the assembling form. Every part bears a number or mark that finds a corresponding number or mark on the form. And it is in the great sub-division of labour, by which all parts of a boat are manufactured simultaneously, that the anticipated saving in time and expense will be effected. This sub-division of labour will also apply to the adjustment on the form of the various parts of a boat. And this is the only feature under the new system that requires the exclusive application of manual labour. Although Mr. Thompson has invented or adapted machines for the manufacture of every part of a boat, he has not yet invented a machine for putting those parts together. The final operation must still be performed by those mortal guides without which machinery itself would become a stagnant power.

To an entire stranger who has neither seen the new process in operation nor heard any explanation thereon, there may appear something almost incomprehensible even in the announcement of "boat building by machinery."

Fig. 2.



So romantic does the thing appear to a stranger, that on one occasion a certain gentleman, one of the Lord Dundreary type, on his way to Mr. Thompson's factory, wanted to know "whether a log of wood, after passing through a machine, would reappear on the stage as a ready-made boat?" Mr. Thompson's inventions are not of such a "sensational" character as that, although, by his new process of boat building, he turns everything upside down.

But before I refer to the machines by which the component parts of a boat are shaped, let me direct your attention for a few moments to the magical performances of a little outsider. Though a grating or trellis-work foot board does not form an integral part of a boat, it is nevertheless a necessary appendage. On the table is the model of a little circular cutter, or—as some call it—a "drunken saw." Yet, even in its unsteady movements, it will accomplish in a few minutes what, by the old system, would occupy one of the most sober of workmen at least half a day. This saw has a lateral as well as a longitudinal set of teeth. By the aid of a small screw lever it is forced from its perpendicular position, according to the width of the cutting that may be required. The irregular or oscillating motion thus produced, when it is revolving rapidly, multiplies the teeth, as it were, till they become a surface cutter or circular plough, that clears everything before it. A counterfeit operation may serve to illustrate the process. Let us suppose that above the surface of the table before which

Fig. 3.

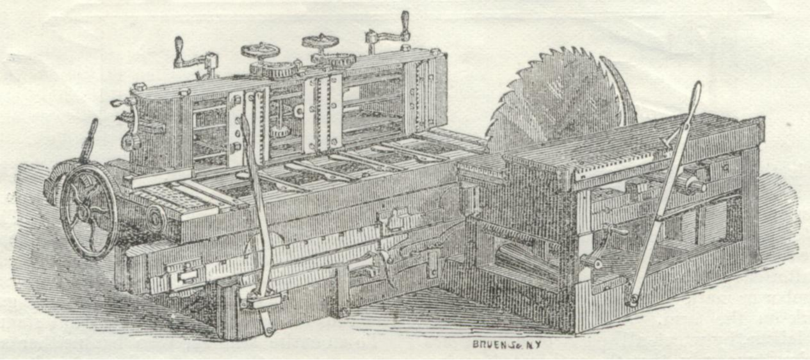
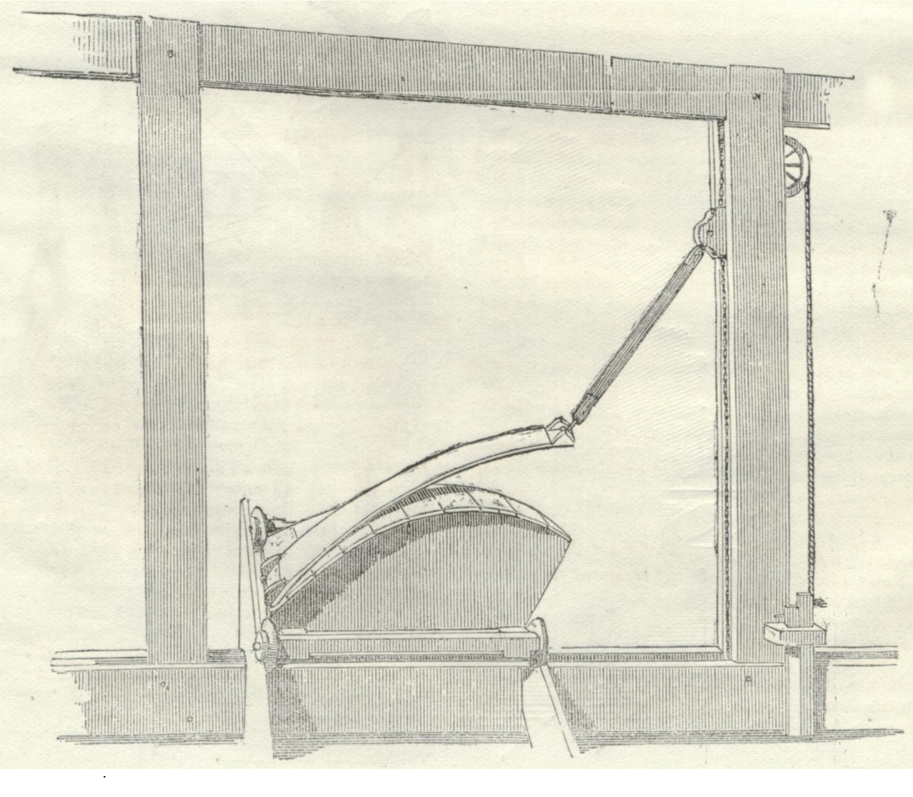


Fig. 4.



I now stand, this little saw shows its teeth to the depth of the tunnels required in the wood that is to pass over it. Placed on a mechanical guide, the plank is thus conducted over the saw by the workman. The result of this operation would be a number of gashes partly through the wood. In another minute the plank has been cut into strips or bars like those on the table. After going through a planing machine (see Fig. 2, p. 55), the bars have only to be crossed on the openings prepared for their jointure, and this produces the grating, a specimen of which is now before you.

I will now refer to a few of the leading machines. And, in this brief reference, I will simply place before you the result of what each is destined to accomplish. A lengthened dissertation on the mechanical peculiarities of such machines does not come within the province of a literary man, unless he were at the same time a scientific man. I will, therefore, at the close of my brief discourse, leave Mr. Thompson to answer any inquiries that may be made by the scientific gentlemen whom I have now the honour to address.

To describe in detail each of the curiously contrived appliances by which the great end is obtained would require more time and a larger amount of mechanical knowledge than I have at command; and a minute description of these machines would afford you but a faint idea of the powerful combination of tools—propelled by steam—which tend to form, as if by magic, superb pieces of naval architecture. The practical value of the invention, or number of inventions, lies in the beautiful simplicity and converging unity of the whole. It is a "system" that must be viewed in its entirety. To regard it in any other way would be like taking a sketch of a majestic human form, minus a leg or an arm. It is a system the operation of which must be seen to be thoroughly appreciated. The most elaborate description would fail to convey a correct idea of the power, beauty, and simplicity of the machinery to those who have never seen it in motion. Writers may enlarge on the wonders of an invention that shapes huge pieces of wood into any form, but who—in the absence of occular demonstration—shall picture to the mind of others the beautiful combination of mechanical units by which a hundred or (by an increased staff) five hundred boats of any size can be made from the rough material in a few days? The *Times* says:—

"The whole machinery possesses the same superiority over hand labour that the power-loom has over the bygone system of knitting. It is the old story of a man working ten hours on wages against a machine that works day and night, and costs nothing but a little oil. Therefore, before long, all boats will be built by steam machinery."

Here we have the model of what is called a "combination saw" (Fig. 3, see preceding page), a saw for cutting a log of wood into planks. There is nothing very remarkable in the saw itself; but there is a combination of advantages in the mechanical contrivances by which the wood is propelled and cut into the various tapering shapes required by the boat builder.

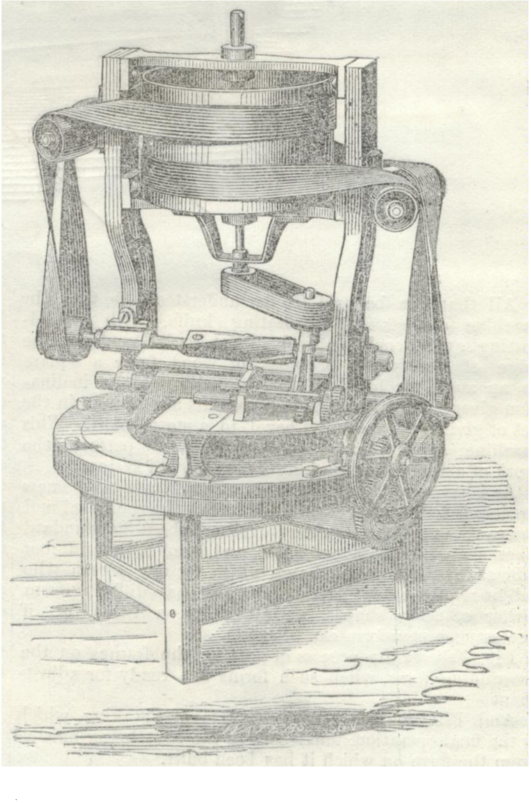
The next step in the system is to bend these planks into the required form. After they have been prepared for this operation by a steaming process, they are placed under a bending machine (of which here is a model, Fig. 4, see preceding page), and, by the aid of steam power, they are rounded to the form beneath with as much ease as a boy would bend a small cane across his knee. The woodcut represents the mode of operation, while on the blocks before you we have a couple of planks in their rounded shape. One represents the forward cant, and the other the midships of a boat. The rounded planks, after remaining for some time in a drying room, become as fixed and firm in their new, as they were in their original shape. They are then cut into ribs, and, after passing through a planing machine, they constitute the perfect ribs.

As a mechanical curiosity, there is probably not another machine in the entire series to be compared with that which gives to a plank its interior and exterior curve at the same moment. This machine is called a curvilinear cutter or plane. Mr. Thompson was many years before he brought this machine to its present state of perfection, and he worked as only an enthusiastic inventor can work. With the exception of as noble a "trio" of American gentlemen as ever took a countryman by the hand, the only comfort or assistance the mechanical workman received from others was in the friendly assurance that he would never succeed. But the inventor happens to be one of those determined individuals who, for success in this life, would rather trust to number one than to any other number. All great inventors have had to do the same thing—otherwise the world would never have had a great invention.

On their passage through this machine, the planks required for a boat of any size obtain their interior and exterior curve at one and the same time. The workman or guide has simply to let the index on the machine correspond with the number on each plank; and the cutters or knives, being concave and convex, any degree of concavity or convexity that may be required is at once obtained.

The *Times*, in its notice of the invention, says that "such a machine, up to the present time, has been deemed a mechanical impossibility, and that the search for its discovery has been as futile as that for the philosopher's stone." So says the *Times*. Yet, in the rapid advances now made by scientific men, the *Times* itself can hardly keep pace with some of the "great guns" of the day. But, although Mr. Thompson has found this wonderful machine, and brought it all the way from America, some of you may be disposed to say—from what has taken place there since he left—that he has brought away the philosopher's stone also. However, here is a model of the machine, together with a specimen of manufacture. (See Fig. 5.) This will enable you to judge of the capabilities of the machinery itself.

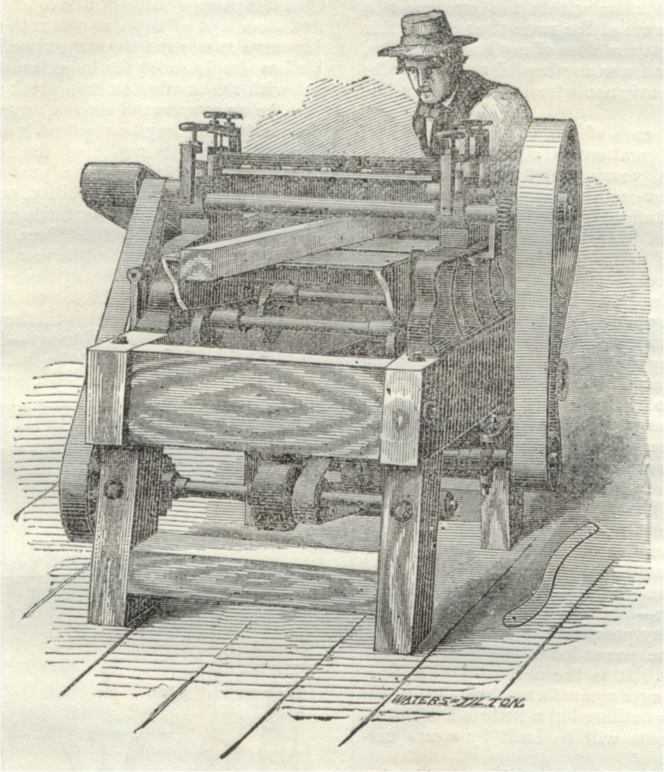
Fig. 5.



To enable those who read this paper to understand it—as well as those who hear it read—it may be necessary not only to offer a few more explanations concerning the machines that are used in the manufacture of the various parts of a boat, but also to furnish one or two more illustrations in order to show the system after every part has been shaped by such machines, and is ready for its final adjustment. With regard to the machines, it is impossible to convey a correct idea to others, or for others to form a correct idea of their mechanical peculiarities machines, by a critical and personal examination. While there are nearly twenty machines used in the manufacture of the various parts of a boat (all in operation at the same time), and while the functions of each machine are of a distinctive character, it would take a good-sized octavo volume to enter fully into the particular properties of the entire series. To be fully comprehended, the system must not only be studied in its entirety, but witnessed in operation.

In addition to the cutters previously referred to, here is an elliptic knife, or diagonal cutter. (Fig. 6.)

Fig. 6.



All that can be said (to be understood) is, that the machine consists of a rotating knife, with an adjusting guide, enabling a clean cut to be made on the edge of any plank or block of wood, from a square to an angle or bevel of 45°, according to the inclination given. The illustration represents a workman in the act of giving the required bevel to a stern-board. This machine, at the lowest computation, will perform the work of a dozen men working under the old system.

As I have previously stated, every boat built by the new process is built on an assembling form. In the naval and mercantile marine there are (together) about 30 standard sizes, shapes, or classes of boats, and forms to that number will always be kept on hand, while for any person who might require a boat or a number of boats differing from either of these shapes, an alteration, addition, or, if necessary, a new form can be made.

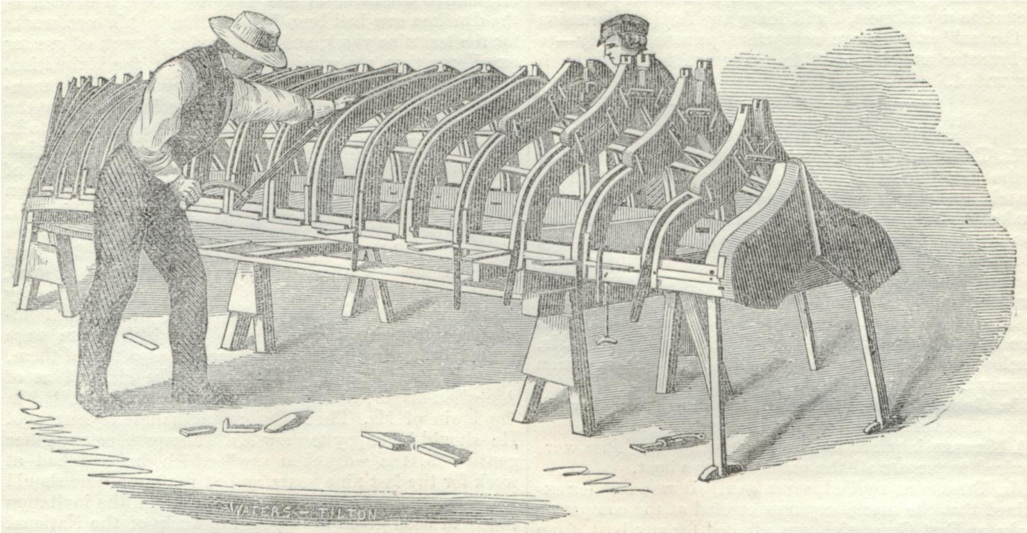
Fig. 7 shows the process of putting the frames on the assembling form, when such forms are ready for adjustment.

And Fig. 8 illustrates the mode of planking, which is the final operation, previously to the boat being hoisted from the form on which it has been built.

There is one point to which I have not before referred. Next in importance to the power of being able to supply the extended demand that must arise in the boat-building trade, through the increased facilities for supply, is that system, or process, in Mr. Thompson's invention which enables the inventor to furnish with each and every boat a duplicate part, or duplicate parts, thereof. By such duplicate parts, any damage a boat may sustain can be at once repaired, without the delay, trouble, and expense either of sending it to a boat-builder, or having it patched up by incompetent hands and insecure means. Further than this—accidents to the boat or boats of a ship often occur at times and places in which boat-builders or carpenters may not be within reach; often, too, when, if such aid could be immediately procured, the service required could not be rendered in the brief space that would make it of any use. This want will in future be supplied, and the countless, and sometimes fatal, inconveniences that have hitherto arisen, will be entirely obviated in Mr. Thompson's system, by which the duplicate parts of a boat can be easily fixed.

It would only be a waste of your time if I were to say anything about the time that will be saved in boat-build

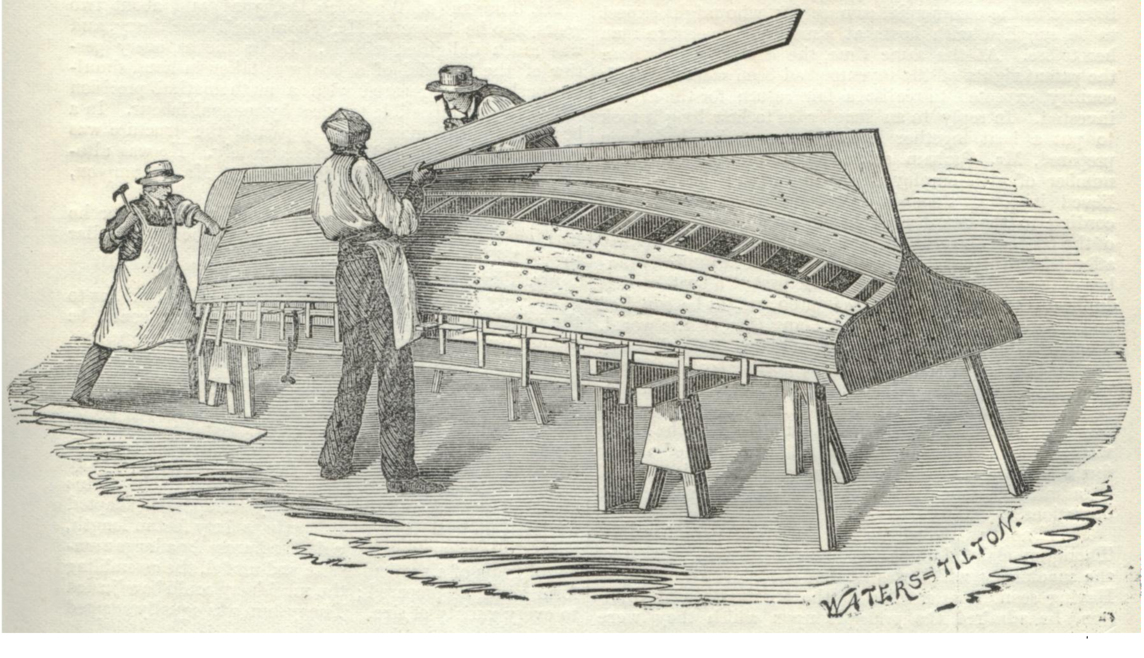
Fig. 7.



ing under the new system. The advantages of steam-power are so well known at the present day, that anything beyond a mere allusion to the subject would be like telling an Englishman that the railway will now take him from one end of the kingdom to the other a little more expeditiously than the old stage-coach.

From the first day on which Mr. Thompson's invention was seen in England, and as the first Englishman who saw it, I have watched with some anxiety—not the difficulties that had to be overcome by the invention (there were none), but the difficulties that were found on the slippery steep and rugged path that led to its final adoption. Happily these troubles have all faded away, and I will close this introductory address by recording my humble testimony (and I am sure I do so with the hearty concurrence of the inventor) to the skill and assiduity displayed, not only by the inventor's brother (Mr. John Thompson), but also by his two superintendents, Mr. John Green and Mr. William Vyse. Although they have not invented the new system for boat-building, they have been the vital instruments by which the invention itself has been practically demonstrated. Whatever external assistance may have been rendered by others, these practical mechanics have worked like slaves within the factory; and as we are all advocates for the abolition of slavery (although we have been very quiet on that subject lately) you will be glad to learn that the gentlemen alluded to may now return

Fig. 8.


WATERS = TILTON.

to their own country as free and, I trust, independent men.

In thanking you for the attention with which you have listened to my address, I will leave any further discussion on the subject to more competent persons, namely—to the inventor and the scientific gentlemen by whom he is surrounded.

DISCUSSION.

Mr. **THOMPSON** (having been introduced to the notice of the meeting by Mr. Puseley) begged, on behalf of himself and those associated with him, to return his thanks to that gentleman for the way in which he had brought forward the subject. It was, he said, one thing to invent, and another thing to be able properly to describe the invention; he must, therefore, leave it to speak for itself. It was impossible to give any detailed explanation of the various machines, the models of which were before them, further than had been done by Mr. Puseley, and it was necessary to see them in operation properly to understand them.

Mr. **GREEN** having pointed out the description of work which the several machines were designed to execute,

A **MEMBER** inquired how many separate machines were required to prepare all the materials for a boat.

Mr. **THOMPSON** replied, seventeen. It was further explained that the machinery now erected at the company's works at East Greenwich was adapted for any boat, from the smallest size up to 32 or 40 feet in length. The steam-power employed consisted of two engines of 40 horse-power each. The only operation left to be performed by manual labour was the putting of the various parts of the boat together on the "assembling form," after they had been prepared by the machinery.

Mr. **PETER GRAHAM** said, having seen the machinery in operation, he could entertain no doubt of its efficiency as a substitute for manual labour in the preparation of all the parts required for the construction of a boat. The saving effected was in the labour, because the material was the same whether prepared by manual labour or by machinery. Mr. Turner, master shipwright at the Royal Dockyard, Woolwich, had expressed his opinion that the saving in labour effected by this machinery might be represented by the ratio of seven to thirty-two, or, in other words, that the cost by machinery was less than one-fourth that by manual labour. That, he thought, was a fact of great interest to the commercial community, who might expect to be supplied with boats at a much cheaper rate than heretofore. At the same time, the company by whom the patent rights of the inventor had been secured in this country, expected to realise a fair return for the capital invested. In reply to an inquiry as to how long it took to put a boat together after the material had been prepared, Mr. Graham said that depended upon the number of men employed on the work; but he believed it could done in from five to ten hours, according to the number of hands employed and the size of the boat. The great advantage consisted in the facility afforded by this machinery of making an unlimited number of fac-similes of each particular part of a boat, so that duplicates of parts likely to be injured, might be supplied and fitted by unskilled hands in any part of the world. That was important in the case of ships at foreign stations, where there was a difficulty in getting boats repaired. He quite agreed with Mr. Thompson, that in order properly to appreciate this machinery it should be seen in operation; and he might state that as soon as the works were started, which would be in the course of a very few weeks, those who were interested in the subject would be admitted, under proper regulations, to witness the operations.

Mr. **BROOKS** wished to be informed whether Mr. Thompson claimed to be the inventor of that portion of the machinery which was termed the "drunken saw?" Having seen these models in the International Exhibition, he admired the principle upon which they were constructed, but he pointed out to the person in attendance as Mr. Thompson's representative, that there was no originality whatever in the saw described, inasmuch as the drunken saw had been in operation in his own works for the last nine years, and had produced work of greater excellence than the specimens he saw at the Exhibition. Nine years ago one of his workmen invented this arrangement of the saw, and it was a curious coincidence that the term "drunken saw" should then have been applied to it, and repeated in the present instance. He should be glad to be informed whether the idea as to the originality of the invention came across the mind of Mr. Thompson when he took out his patent in 1860. It was not his (Mr. Brooks's) intention to discuss the details of these seventeen various machines. Many of them showed great skill in their design, and were doubtless original, but the question for discussion was not the quality of the workmanship, but who was the rightful inventor of some of the machines of which there were models before them? With regard to a portion of them, at least, he thought they could not be claimed as of American origin; if they were, they must have existed in the brain of Mr. Thompson more than ten years ago. He should be happy to show Mr. Thompson, or any other gentleman, the "drunken saw" which he had had at work for the last nine years, and at the same time should feel great pleasure in availing himself of the invitation that had been given to inspect the works of the National Boat-building Company.

Mr. **THOMPSON** said, with regard to the drunken saw, he had laid no claim to its invention. It had been in use in the United States of America for at least forty years. All he claimed was the adaptation of that implement to its present purposes, and the peculiar arrangement for producing the oscillating motion given to the saw. The system of machinery in its entirety was what he laid claim to, and its adaptation to purposes to which it had never been previously applied.

Mr. **PUSELEY** said it was distinctly stated in the paper that while some portions of the machinery were originated by Mr. Thompson, he had also adapted previous inventions to his purposes. He had never claimed to be the inventor of the drunken saw. As a whole, he had adapted this machinery for the purpose of preparing the material for boats in one-fourth of the time it could be accomplished by manual labour.

Mr. **TURNER** (of Woolwich Dockyard) said about two years ago he inspected Mr. Thompson's machinery, and was much delighted with it. By its means, every portion of the material of a boat was taken in hand simultaneously, and prepared with a mathematical precision which it was impossible to effect by manual labour. In a boat built in this manner, every part of the structure was brought in contact, and fitted accurately. He was altogether delighted with the invention of Mr. Thompson, and wished him every success.

Mr. **THOMPSON** begged to ask Mr. Turner whether he had ever seen the same ends accomplished by similar means?

Mr. **TURNER** replied that he had not.

In reply to an inquiry by Mr. **CHARLES CLIFFORD**, as to the variety of form and size of boats which could be manufactured by the machinery set up by the company,

Mr. **PETER GRAHAM** said they had at present twenty-six assembling forms, which were adapted to as many descriptions and sizes of boats. Any variation in the particular form of a boat would, of course, require a separate assembling form; and as these forms were somewhat expensive, it would not answer to make a form merely for half a dozen boats of a particular model. The forms already prepared, and the machinery set up, were adapted for boats up to thirty-two and perhaps forty feet in length, and fifty tons burthen. If a demand arose for a large number of boats of a particular size and model, the assembling form would be prepared; the machinery could be adjusted to every variety of size. The system was equally adapted for cutters of extremely fine lines and boats of broad beam.

The **Secretary** said the machinery would fashion the materials for any form of boat that was demanded; but in order to put it together an assembling form must be prepared of the model required. If a form was made merely for one or two boats, of course these could not be built relatively so cheaply as a larger number of the same form; but the machinery was adapted for any lines that might be required.

Mr. **Peter Graham** added that the cost of the materials would be the same, whether prepared by manual labour or by machinery; but the labour in the preparation was reduced by machinery to about one-fifth that of hand labour.

Mr. **Turner** remarked that the great point of the invention was the rapidity of production. He believed Mr. Thompson could build a boat complete in five hours.

Sir **Thomas Phillips** said he thought they were discussing with too great minuteness the details of the invention. All that was intended to be done was to submit to the Society a series of machines whereby a boat might be built in a very short space of time. with a great economy of labour. To Mr. Thompson certainly belonged the merit of having produced a great many ingenious machines, which he had applied to the effecting of a particular object, and in that he apprehended the inventor had entirely succeeded. They had been assured by a gentleman holding an important position in the public service that he was satisfied that, by these means, a boat could be built in an exceedingly short space of time, which was a most important object to be secured. So far, then, there was neither doubt nor difficulty. Whether or not the system would be productive of any great amount of commercial gain, must depend upon its practical adaptation to the wants of the community. There could be no doubt if, instead of varying indefinitely the type of the boats, they could build boats of a certain capacity of tonnage, upon a particular plan, whereby they might produce a large number of the same type, the economy which was promised by this plan would be secured; but it was obvious that it would not answer the purpose of these gentlemen to take an order for a single boat of an exceptional form, inasmuch as the commercial results must depend upon the production of a large number of a given type. With regard to the question whether Mr. Thompson was the inventor of a particular machine or not, that was not a matter of any great interest to this meeting. The question was this—had Mr. Thompson adapted machinery—no matter by whom invented—and rendered it applicable to a new object, which had never before been accomplished by machinery? If he had done so they would regard him as a public benefactor; the invention was in itself a highly creditable thing to Mr. Thompson, who had no doubt devoted a considerable portion of his life to the production of this system, and if he succeeded in producing great commercial advantages, the public at large would have the benefit of them; but if he did not succeed, he (Mr. Phillips) was sure they would accord to him that sympathy to which all men who pioneered for the good of society were entitled.

The **Chairman** said that, after the numerous explanations that had been given, very little was left for him to say on the subject, but there were one or two points which occurred to him, having witnessed the whole of the operations, and being himself a practical man in these matters. All the materials for a boat might be cut out and prepared by this machinery for putting together. It then required skilled workmen to put the parts together. One point requiring consideration was, that the planking, being cut by machinery, they might fall into the error of its fitting too well, because it was necessary to caulk it, and if the boat were not built for caulking she would tear herself to pieces. The grating, of which they had seen a specimen, had been produced in a somewhat similar manner for nearly fifty years past, but not prepared precisely in the same way. It was produced by a series of teeth, on the periphery of a wheel, so placed as to come into action in succession, an arrangement similar to what was used in Woolwich Arsenal for planing gun carriages in 1810. It had been seen that if a boat was required of different form—whether leaner or broader—it was very easy to fit battens on the outside of the assembling form, so as to adapt it to the required shape. There was a great advantage attending the planking prepared by these means, namely, the cutting of the planks to fit the curves of the boat, without straining them to bring them into position. In point of fact, he believed his friend, Mr. Turner would say they were in the habit of putting too much stress on a boat, instead of adapting the planking to fit without straining. The rabbeting of the keel, stem and stern, by this process, was very complete, and no man could arrive by hand at the precision which this machinery produced. With regard to the question of duplicate parts, he was not quite disposed to fall into the views expressed. If they had duplicate parts to take with them they must have literally duplicate boats, but the real advantage was, that duplicates could be kept at foreign stations, where a captain of a ship might take the duplicates and either repair or build a new boat, or three disabled boats might perhaps build two complete ones. The parts prepared by this machinery might be likened to the component parts of a watch, which were made by machinery and sold to a manufacturer for a small sum, and he eventually finished them up to form a complete watch or even a chronometer. So in this case, with a slight finishing, these machine-prepared parts might produce a perfect boat. With regard to the question of the drunken saw not having been the invention of Mr. Thompson, that was not now before them. Mr. Thompson did not claim it, but if he had done so, it was a question of law, and the man who claimed the patent must make good his right if he could. Mr. Thompson had gone through the fire nobly, and he wished him every success; he was sure this Society would be very glad to thank him and Mr. Puseley for having brought this very interesting subject before them.

Thanks were then voted to Mr. Thompson and Mr. Puseley.

The Secretary announced that on Wednesday Evening next, the 10th inst., a Paper by Mr. John Taylor, jun., "On the Construction of Labourers' Cottages, and Sanitary Building Appliances," would be read. On this evening Major-General Tremenheere will preside.

ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, held on Tuesday, November 25th, **William Fairbairn**, Esq., C.E., F.R.S., in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

During the past month there have been examined 365 engines and 547 boilers. Of the latter 8 have been examined internally, 60 thoroughly, and 479 externally, in which the following defects have been found:—Fracture, 5 (1 dangerous); corrosion, 38 (3 dangerous); safety-valves out of order, 13; water gauges ditto, 31; pressure gauges ditto, 9; feed apparatus ditto, 6; blow-off cocks ditto, 47 (1 dangerous); fusible plugs ditto, 3; furnaces out of shape, 6 (2 dangerous); blistered plates, 3; deficiency of water, 1. Total, 162 (7 dangerous). Boilers without glass water gauges, 10; without pressure gauges, 2; without blow-off cocks, 38; without back pressure valves, 78.

An explosion has occurred this month to the boiler of a first-class passenger locomotive engine, by which three persons were killed and others injured. It was considered to be perfectly safe, had been on duty the previous day and was being cleaned ready for work at the moment the explosion occurred.

It will be remembered that reference was made in the July, 1861, report, to another explosion of a locomotive boiler, which took place while the train was running; and since that time three others have occurred in addition to the one first alluded to, thus making five during that period with this class of boiler.

The cause of explosion in four of these cases proved to be thinning of the plates from internal corrosion. I have only had an opportunity of examining the plates of one of these exploded boilers, but from the official report, it appears that the corrosive action had developed itself in a very similar manner in each instance, which in the one personally examined was as follows:—The corrosion had eaten grooves or furrows parallel with and close to the edge of the overlaps of the plates, at some of the longitudinal seams of the rivets; the furrows being on the outer plates of the overlap, while the deepest one, and that from which the explosion had sprung, was situated nearly midway between the smoke-box and fire-box.

This furrowing action will be at once recognised by those who have been in the habit of observing the influence of wear upon the ordinary internally-fired double-flued boiler, in general use in Lancashire. In this boiler the furrow is found on the inner surface, both of the front and back-end plate, but more especially at the front, and lies close to the edge of the internal flue angle-iron, which it partially encircles; the furrow being deepest at the crown, and gradually dying out in about six or nine inches on each side. It is sometimes found in the root of the angle-iron itself; the choice of position between the plate and angle-iron, apparently depending upon their comparative power of resistance. When the plate of the furnace-tube is flanged, the furrow more frequently occurs at the springing of the flange than at the end-plate. Furrowing also is very commonly found at the transverse seams of rivets at the underside of boilers; the furrows in these cases being immediately at the edges of the overlaps, and most frequently on the external surface of the plates, but sometimes on the internal. This action is more severe in long boilers than in short ones, and at the middle of their length rather than at their ends. It is seldom, if ever, developed at the longitudinal seams of these boilers, except where leakage takes place, and is then found to be most severe when the objectionable plan of construction is adopted, of placing the seams of rivets in one continuous line from one end of the boiler to the other. Such are some of the manifestations of furrowing constantly met with in the boilers under the inspection of this Association, and it may be interesting to attempt to trace the cause.

Furrowing appears to be the result of corrosive and mechanical action combined. The mechanical action, such as an alternate buckling of the plates, strains and frets them, and thus renders them more susceptible to the influence of corrosion than the parts at rest. Where these furrows are internal, the corrosive element is furnished by the water, which is rarely, if ever, free from acidity; and when the furrows are fonnd externally in the flues, as explained above, the corrosion may perhaps be attributed to the influence of the gases.

The cause of the buckling action varies according to the position in which it occurs.

In the stationary boilers above referred to, when found in the front end plate, it may be ascribed to the alternate elongation of the internal flues, more especially at the furnace end; and, when at the bottom of the external shell, to the unequal expansion of the plates consequent upon the different strata of temperature in the water. The temperature of these strata varies with the distance from the bottom of the boiler, in proof of which it may be stated that it is frequently found that while the water is boiling on the surface, that at the bottom of the boiler will not scald the hand. Those boilers are most conducive to this inequality of temperature which have a defective circulation of water, are so set that the least heat from the fire passes beneath them, and fed with comparatively cold water introduced at the bottom. It will be readily seen how these varying temperatures induce unequal expansion of the plates, and thus put upon the seams of rivets most irregular and severe strains. In this way, it is thought that the buckling action is produced, which results in furrowing at the bottom of stationary boilers.

In locomotive boilers the buckling at the longitudinal seams, in the cylindrical portion of the shell, arises from their not being of true circular form in the vicinity of the overlaps. The tendency of the internal steam pressure is to correct this, and to induce a true circular form, and thus a cross strain which may be correctly termed a "girder strain," is put upon the plates at a short distance on each side of the line of rivets; from this a change of shape ensues, which constantly varies with the pressure of steam. The position of the furrows is found to be that of greatest elasticity, being midway between the fixed ends of the fire-box and smoke-box, just where this buckling action would have most play. It will at once be seen that the thicker the plates the greater the leverage of the girder action, and thus to thicken their edges is only to aggravate the evil. The true circular shape may be maintained, as far as appearance is concerned, by substituting a butt-strip for the overlap, but this, from its one-sidedness, will not prevent the girder action, and, indeed, tends to make two furrows instead of one. Were an inner as well as an outer butt-strip introduced, the parts would be in equilibrio, and the strain then passing through the centre of the plates, they would be subjected to their legitimate tensile strain only, and the buckling action in question set at rest.

But whatever expedients may be adopted to meet special cases, as one after another may force itself upon attention, some general precautionary measure appears to be needed to guard against the subtle influence of corrosion. It is often found, in a line of one hundred rivets, to attack ten and neglect the remainder; in an entire boiler, it will affect one or two plates and not the rest; and even in a series of boilers will select one in preference to the others. No doubt careful analysis might detect some predisposition in the metal, and thus account for these apparent anomalies, but the difficulty of foretelling the precise course of corrosion must be candidly acknowledged, and hence the necessity, as just stated, for the adoption of some sweeping precautionary measure, which will embrace every case without distinction.

The Association meets the difficulty with its own members by affording them the opportunity of having what is technically termed a "thorough examination" of each of their boilers once a year, when all the seams as well as the surfaces of the plates, both outer and inner, are examined throughout, provided that the boiler is suitably prepared for the inspection. The conviction of the importance of these examinations—which such explosions as the one under consideration serve to deepen—may explain the frequency with which reference is made to this subject. Indeed, the Association cannot hold itself responsible for the safety of any of the boilers under its charge, where the opportunity of making an annual "thorough examination" is withheld. In addition, it recommends to those members using multitubular boilers, that such an arrangement of tubes should be more generally adopted as will admit of a man's gaining access between them and the shell for the purpose of examination, while those should apply the hydraulic test annually, who are employing boilers which will not admit of complete examination.

From the experience derived from the boilers under the inspection of this Association, it certainly appears hazardous to allow locomotives to work, as is very usually done, for five or seven years, without a complete internal examination; and it therefore becomes most important, either that some searching test should be adopted that shall at all times ascertain the sufficiency of the boilers without removing the tubes, or else that their construction shall be so modified that the parts may be rendered accessible to complete examination. The occurrence of four explosions to locomotive boilers, from internal corrosion, within the last eighteen months, must show the necessity of taking this subject into serious consideration.

Setting Boilers.—Considerable difficulty is experienced in examining many boilers from the contracted area of the flues, some indeed are altogether inaccessible. Boiler setting appears to be left too much to the individual tastes of the bricklayer, and consequently, flues of every variety of proportion are met with. A sketch has been drawn up of the proportions most generally approved, and at an early opportunity a description will be given—which space does not now permit—for the assistance of those who are re-setting their old boilers or laying down new ones; meanwhile, a drawing lies at the office of the Association for the inspection of members.

Home Correspondence.

WORKMEN'S HALLS.

Sir,—Having a few days back read the enclosed in the "Morning Star," I acted on the permission of the last paragraph and obtained a very practical set of rules. It has since occurred to me that other members of our Society might like to avail themselves of the opportunity of getting hints. Yours, &c.,

GEORGE F. WILSON.

Price's Patent Candle Company (Limited),
Belmont, Vauxhall.

TO THE EDITOR OF THE "STAR."

Sir,—The strong desire which exists to provide for working men places where they may spend their evenings innocently, induces me, as one of the committee of the Southampton Workmen's Halls, to beg a little space to set forth the advantages of such institutions.

We have now three halls successfully established in this town, two of which are situated in the very lowest and poorest districts. The first was opened in June last, and in spite of long summer evenings and the distrust which at first existed, we had upwards of 700 men, engaged in sixty-eight different trades, join us before we had been established two months. To enable them to judge for themselves the first hall was opened free; but before a month had elapsed the working men themselves convened a meeting, at which upwards of 200 attended, and they decided by an unanimous vote to support it by a penny per week subscription! This voluntary taxation shows how they appreciated the advantages offered; and as our numbers increased so rapidly it was necessary to open a second and third hall. It is a very gratifying sight to see 100 to 150 labouring men (the great mass of whom are entirely beyond the reach of Mechanics' Institutes or Athenæums) assembled together in their working clothes, and with as much order and decorum as in a West-end club, engaged in reading, or in the various games provided for their pleasure.

The first object of the committee has been to provide recreation; and believing that labouring men and mechanics require relaxation as much, or more, than the classes above them, various games, such as bagatelle, dominoes, draughts, travelling maps, fox and geese, spillicans, puzzles, &c., &c. (in fact, the games that we admit in our families), are freely encouraged. The bye-laws against betting, gambling, and improper words are strictly adhered to; and the self-restraint and wholesome discipline exercised in this way alone is very important. They all seem contented, and learn to enjoy life without the stimulus of betting, drinking, or swearing.

The main secret of our success is that we let them alone. There is such an universal readiness the moment you catch hold of labouring men to subject them to a severe course of mental drilling and moral physicking that they even now can hardly believe they are at liberty to come and go when they please, and to read, talk, and play, or have a nap if they prefer it, without our wishing to "improve the opportunity" by dosing them with our favourite nostrums before we have gained their confidence either as benefactors or as mental doctors.

Smoking is allowed in the main halls only; and we have a library room, a writing room, where men can quietly write home to their friends, and a class room, in which those who can neither read nor write can be instructed. There is also a front shop for the sale of coffee, cocoa, &c., and as many as 170 half-pints of these beverages have been sold to members on a Saturday night. We close at a quarter-past ten p.m. except on Saturdays, when we keep open until eleven, in order that our members may not be tempted to squander their weekly earnings at the beershops on their way home.

We admit no lads under eighteen years, but we have two rooms at one of the halls specially for boys from fifteen to eighteen; and on Sundays the Scriptures are read aloud in the evening to 50 to 150 of the poorest class, many of whom are too ragged and too dirty, as well as too indifferent, to go elsewhere.

Weekly readings by gentlemen, interspersed with recitations and songs by the working men, are held at each hall every Wednesday, and are usually full to overflowing, as the members are specially invited to bring their wives and families on these occasions, that they may unitedly enjoy an evening's recreation. Each hall has an executive committee of working men, and we have a central committee of gentlemen of which Sir G. B. Pechell, Bart., is the president. We have also a trade register for men seeking employment, and it is proposed to open one or two benefit societies in connection with the institution.

The fear that we may "take men from their fireside" finds no echo in the hearts of the poor wives. The inducement to domestic husbands to spend an hour or two at the hall, in company with their fellow men, weighs as nothing compared with the benefits afforded to the large mass of married men whom it draws from more dangerous places. There is also a large proportion of unmarried men in every town who have no family hearth to go to; men who only rent a bedroom, or perhaps half a one, and have no place where they can sit with comfort after the day's work is over, and for whom the corner of the street or the public house tap room is the only place of rendezvous. It is too early yet to speak of results, but we have already most cheering cases, in which poor women have called purposely to express "the good the hall has done them." "I havn't been so happy for years," said one; "my husband comes home sober and good-humoured, and brings his money too."

The intermingling of all classes of workmen is also very beneficial. "It aint the drink, but the company, I goes for," is the confession of many a poor tippler; and he here finds not only a larger, but better and more obliging company of his own class than he can get elsewhere, and he becomes as civil and obliging as the rest. One of this class told his wife the other day, "I didn't suppose I ever could have felt so happy as I have been since I went to the hall." The joyful atmosphere is certainly very infectious, as I myself have witnessed.

It is too early for us to decide the question of these places being wholly self-supporting; but we can see that the men's pence will go a long way towards this great desideratum. Had space permitted, I would also like to have given a rough statement of the first cost and working expenses required in town or country places, but I have already outrun my bounds in the zeal with which I have advocated the cause.

On receipt of two postage stamps I will gladly forward by post the rules, &c., by which we are governed, should any of your readers purpose opening similar establishments.

I am, yours respectfully, W. C. W.

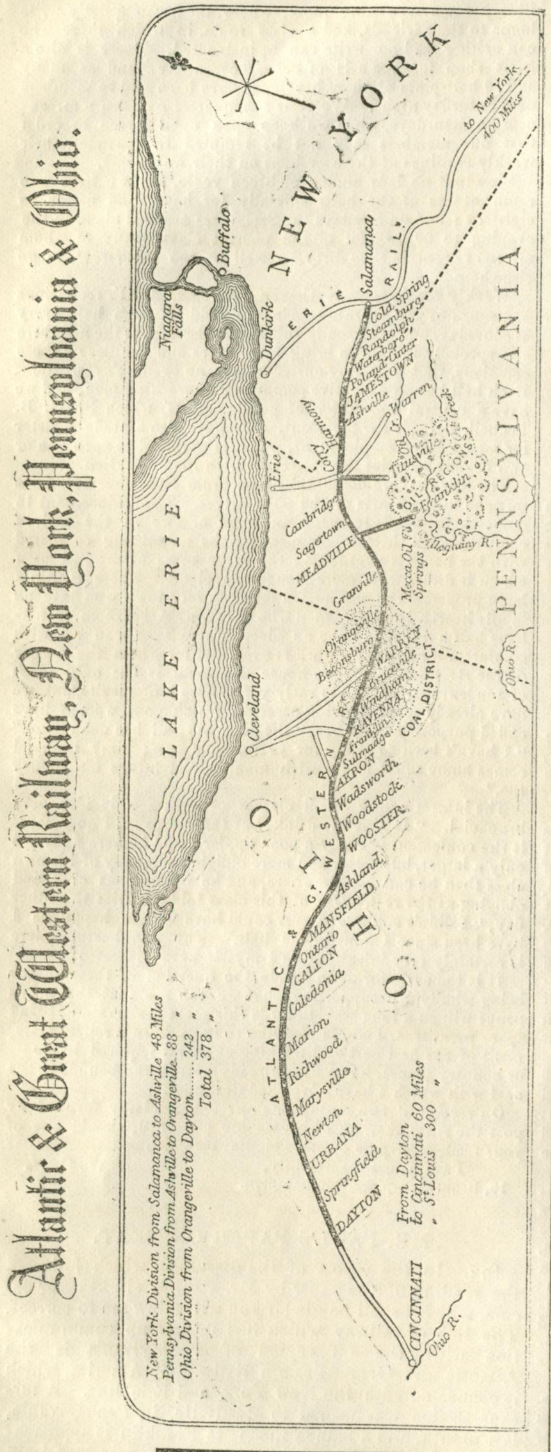
10, Brunswick-place, Southampton.

MR. PAUL'S PAPER ON PEAT.

Sir,—In the report of the discussion which followed the reading of the paper by Mr. Paul, a slight error occurs, which I shall be glad if you will allow me to correct. The line of railway which has opened up communication with the oil region of Pennsylvania is the Atlantic and Great Western Railway of America, which is connected with the New York and Erie line. A further section was opened to Meadville, in Pennsylvania, last month, and a branch thence to Franklin is approaching completion. By the kindness of the Secretary I am enabled to enclose an engraving—(see next page)—which will indicate the locality of the famous oil wells of Pennsylvania. I am, &c.,

JOHN CASSELL.

La Belle Sauvage-yard, Ludgate-hill, E.C., Dec. 2, 1862.



Atlantic & Great Western Railway, New York, Pennsylvania & Ohio.

Proceedings of Institutions.

Glasgow Athenæum.—At the examination of the Society of Arts, held in May last, forty-one students of the Glasgow Athenæum obtained thirty-three certificates—26 first-class, 17 second-class, and 13 third-class—besides eight prizes. In addition to these rewards of merit, Hugh Tennent, Esq., of Errol, awarded a prize of £5 each to the four students who had most distinguished themselves, viz., John Allan, John Jackson, Robert Rodman, and Robert James Bridge. At the distribution of the prizes, which took place on Thursday, the 30th Oct., Mr. Tennent handsomely placed £20 at the disposal of the directors, to be given to those students of the present session who excel the most at the examination in May next. It is understood that several other gentlemen have intimated their intention to imitate so excellent an example.

London Mechanics' Institution.—The distribution of prizes and certificates of the Society of Arts, obtained by members of this Institution, took place on Wednesday, the 5th Nov., Harry Chester, Esq., presiding. In opening the proceedings, the chairman said the duty he had to discharge could not be otherwise than agreeable, especially to one who had had some share in originating and carrying out the system of Examination, one of the results of which was the interesting ceremony about to take place. He was glad to be able to congratulate the London Mechanics' Institution on the honourable position it occupied in relation to the Society of Arts' Examinations, which proved not only that the instruction that it afforded to its members was of a sound and satisfactory description, but that it possessed a highly-efficient Local Board of Examiners. Indeed, it was impossible to conceive how a Local Board could better discharge its functions; for he found that out of the forty-eight candidates it had sent up to the Society of Arts' Examinations, during the last four years, only one had failed to obtain a certificate; and during the past three years the thirty-nine candidates sent up had obtained, between them, fifty certificates, besides several prizes, not a single failure having taken place. Several of the students now about to receive certificates had, in previous years, obtained similar marks of distinction in other branches of knowledge, either in London or elsewhere; showing that the effect of the Examinations had been to induce students to come up year after year, and to persevere in their studies. And one of the recipients, Mr. Macdonald, who now took first-class certificates in book-keeping and practical mechanics, with money-prizes of £5 and £3, had been nominated by the Council of the Society of Arts to compete for a clerkship in the Privy Council Office. Having explained the nature of the Prince Consort's annual prize of 25 guineas, the chairman said it would be very agreeable to him to find that the successful competitor next year was a member of the London Mechanics' Institution. He believed the great majority of recipients of the prizes and certificates were young men and women of high moral character, who felt that they were bound to cultivate the talents God had given them to the utmost of their power, not simply to raise themselves in their class, but to supply their minds with the perpetual sources of joy and pleasure to be derived from knowledge. The Society of Arts' Examinations were intended to supply to the middle and working classes some of the advantages which had been so long supplied to the higher classes in the Universities. Several Government appointments had been placed at the disposal of the Society for the recipients of its prizes and certificates, and he was happy to say that the candidates who had been nominated to them had, in their various posts, done great credit both to themselves and to the system of Examination by which their talents had been drawn out, and their merits revealed.—Mr. T. A. Reed, the hon. secretary of the Local Board, explained to the members the nature and advantages of the Society of Arts' Examinations, and urged on them a diligent prosecution of their studies, with a view to the possession of well attested certificates of merit. The advantage to be gained was not so much in the Examination itself, as in the placing before the student a specific object to be attained. Let two young men with equal talent and opportunities commence the study—say of history or geography—one having the ordinary motive of a desire to advance in knowledge, while the other superadded to that the prospect, at a year's end, of a searching examination, upon the successful result of which would depend his possession of a certificate, attesting his proficiency ; and who could doubt that the student influenced by the double motive would far outstrip the other who had no prospect of examination before him ? Not that the desire of attaining a prize or certificate was the highest possible motive in the prosecution of one's studies—the most exalted motive in the acquisition of knowledge was the desire to apply it to the purposes of human welfare ; but this rarely prevailed in early life, when the ruling intellectual principle was a love of knowledge for its own sake, to which it was the object of the Examinations to give a definite direction and an appropriate stimulus. With a view of smoothing the way to the Society of Arts' Examinations, the Local Board of the London Mechanics' Institution had instituted Special Examinations of its own, of a less formidable character. The principal classes of the Institution were examined annually, and book-prizes were awarded to the successful competitors. The requisite funds had hitherto been provided by the prizes awarded to the Local Board by the Society of Arts, supplemented by some voluntary donations ; but as such prizes were no longer given, they had to rely entirely on the individual donations of the friends of the Institution. A prize of £5 had been offered to the members for the best essay "On the Right Use and Judicious Selection of Books," but none of the essays received appearing to the Local Board to be sufficiently meritorious, the prize had not been awarded. Mr. Reed then alluded to the successful results achieved at the Institution in connection with the Examinations, and the collateral benefits they had produced. The certificates and prizes of the Society of Arts were then presented by the chairman (a list has appeared in the *Journal*). The following Local Board book prizes was then distributed:—Geography, G. M. Norris; writing, Alfred Page; ditto, Caroline Hoare; arithmetic, F. Norris; grammar, Walter Kelly; French, E. M. Beard; ditto, Fanny Beard; landscape drawing, Henry Mullet; mechanical drawing, Charles Moody; shorthand, A. C. Frisbee. On the motion of Mr. Norris, seconded by Mr. Joseph (two of the recipients) a vote of thanks was unanimously accorded to the Local Board, which was briefly acknowledged by Mr. Reed. The Hon. Dudley Campbell proposed a vote of thanks to the chairman, and expressed his sense of the high value of the educational efforts made by the Society of Arts. Mr. Pearsall seconded the vote of thanks, which was unanimously adopted. The Chairman having acknowledged the compliment, the proceedings terminated.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Mr. A. Michie, "Narrative of a Journey from Tientsin to Mukden, in Manchuria." 2. Mr. Charles Mitchell Grant, "Route from Pekin to St. Petersburg, *via* Mongolia, Siberia, and Moscow."
Medical, 8½. Clinical discussion. Communications by:—1. Dr. Thudichum, "On a case of rapid wasting Palsy from structural disease of the spinal marrow." 2. Dr. Brunton, "A new auroscope, practically shown." 3. Mr. Hulke, "Fibro cellular polype from the ear." "Ivory peg used in a case of ununited fracture." 4. Dr. Jephson, "A case of Myelitis successfully treated." And other papers.

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Makinson's paper "On some of the Internal Disturbing Forces of Locomotive Engines."
Zoological, 9.
Syro-Egyptian, 7½. The Rev. Mr. Cowper and Dr. Benisch, "On a Hebrew MS. of the Pentateuch, on brown skin."

Wed. ...Society of Arts, 8. Mr. John Taylor, jun., Architect, "On the Construction of Labourers' Cottages and Sanitary Building Appliances."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
Royal Society of Literature, 4½.

Thurs...Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Philosophical Club, 6.

Fri.......Astronomical, 8.
Sat ......Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

Dated 11th November, 1862.

3036. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the construction of crinoline skirts. (A com.)
3038. Capt. W. Palliser, Dublin—Imp. in the construction of ordnance, and in the projectiles to be used therewith.
3040. J. J. Parkes, London-street, Paddington—Imp. in lever bell pulls.

Dated 12th November, 1862.

3042. W. Harper, Sharples, near Bolton-le-Moors—Imp. in the construction of steam boiler and other furnaces.
3048. F. J. Clowes, 92, Southwark-bridge-road—An imp. in obtaining rotary motion.
3050. J. H. Thomson, Glenboig, Lanark, N.B.—Imp. in machinery or apparatus for finishing and dressing tiles and similar articles of clay.
3052. A. Graemiger Wallenstadt, Switzerland—Imp. in looms.

Dated 13th November, 1862.

3058. M. Defries, Houndsditch—Imp. in the manufacture or construction of lamps.
3060. R. Sykes and P. Sykes, Huddersfield—Imp. in rings used in machines for the continuous spinning, doubling, and twisting of wool and other fibrous materials.
3062. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in preserving provisions. (A com.)
3064. E. Joseph, 134, Blackfriars-road, and J. Danks, 56, Webber-row, Waterloo-road—Imp. in the manufacture of brushes, brooms, and mats.

Invention with Complete Specification Filed.

3061. E. S. Ritchie, Brookline, U.S.—Having reference to the mariner's compass.—13th November, 1862.

[*From Gazette November 28th*, 1862.]

Dated 18th July, 1862.

2056. R. A. Brooman, 166, Fleet-street—Imp. in generating heat in furnaces and fire places. (A com.)

Dated 12th August, 1862.

2260. J. F. J. Leblond, Paris—Imp. in sewing machines.

Dated 29th September, 1862.

2642. J. E. Walker, King-street, Old Ford-road—Imp. in signalling on railways.

Dated 23rd October, 1862.

2855. W. Clark, 53, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 25th October, 1862.

2871. G. Luke and W. Luke, 98, Mott-street, Birmingham—An improved stirrup.

Dated 27th October, 1862.

2886. H. C. R. Joubert, 18, Maddox-street—An improved method of raising and fixing at any height desired music stools, chairs, or seats.
2889. T. Pilgrim, 17, Carlisle-terrace, Fairfield-road, Bow—An imp. in locks, bolts, latches, and other fastenings.

Dated 28th October, 1862.

2904. C. S. Duncan, Inverness-road, Bayswater—An improved compound or material for coating or covering metallic and vegetable substances to preserve them from corrosion or decay.

Dated 31st October, 1862.

2950. F. E. Sickels, Bute-street, Brompton—Imp. in the means of steering and manœuvring ships or boats, and in the apparatus connected therewith, which apparatus is also applicable for pumping and lifting weights.

Dated 1*st November*, 1862.

2954. W. Tarr, 112, York-street, Oxford-street, Manchester, and E. Farr, 40, Cavendish-street, Oxford-street, Manchester—An imp. in pianofortes.

2956. M. Merryweather and R. M. Merryweather, Long Acre, and E. Field, Buckingham-street, Adelphi—Imp. in steam fire engines, part of which improvements are applicable also to other purposes.

Dated 3*rd November*, 1862.

2962. F. Tussaud, 105, Marylebone-road—An improved machine for cutting metal, also applicable to cutting other substances.

Dated 4*th November*, 1862.

2982. P. W. Reuter, Buckland-crescent, St. John's-wood—Imp. in dyeing. (A com.)

Dated 5*th November*, 1862.

2993. R. A. Brooman, 166, Fleet-street—Imp. in commodes or water closets. (A com.)

Dated 6*th November*, 1862.

3005. B. T. U. Monin, 60, Boulevart de Strasbourg, Paris—Imp. in breech-loading fire-arms.

Dated 7*th November*, 1862.

3009. M. A. F. Mennons, Paris—Imp. in the manufacture of paper. (A com.)

3011. W. Clark, 53, Chancery-lane—Imp. in the means of utilising refuse and azoted matters of commerce. (A com.)

3013. T. Greenwood and J. Schofield, Rochdale—Imp. in mules for spinning and doubling.

Dated 8*th November*, 1862.

3015. H. Gardner, Chaple Town, Leeds—Imp. in machinery for treating flax and other fibrous materials preparatory for manufacturing purposes, the said machinery being also applicable for pressing, rolling, grinding, pulverising, or mixing various other substances.

3017. G. H. Ogston, Mincing lane—Imp. in treating nitrous acid and nitric oxide in order to convert them into nitric acid.

3019. W. Simpson, Liverpool—Imp. applicable to letter boxes and other like receptacles.

3020. G. L. Locke, Hampstead New road, and J. Clark, High-street, Kentish-town—Imp. in the motive mechanism of pianofortes.

3021. E. Sonstadt, 3, Stewart-place, Alfred-street-south, Nottingham—Imp. in the manufacture of the metal magnesium.

3023. J. Mellodew and T. Mellodew, Moorside Mills, Oldham, and C. W. Kesselmeyer, Manchester—Imp. in looms for weaving.

Dated 10*th November*, 1862.

3026. C. Connell, Glasgow—Imp. in constructing ships or vessels.

3029. R. R. Holmes, British Museum—Imp. in folding chairs and seats.

3031. J. Shanks, Arbroath—Imp. in mowing machines.

3033. J. Easton, jun., and J. C. Amos, Grove, Southwark—Improved machinery for sawing wood.

3035. G. F. Lyster, Liverpool—Imp. in apparatus for elevating or otherwise transmitting grain and other granular substances.

Dated 11*th November*, 1862.

3037. W. Booth, J. Booth, and T. Booth, Oldham—Imp. in rotary engines.

3041. E. Marriott, Miles Platting, Manchester, and S. Holroyd, Manchester—Imp. in the purification of gas, and in obtaining certain useful products therefrom.

Dated 12*th November*, 1862.

3043. W. Galloway and J. Galloway, Manchester—Imp. in machinery or apparatus for cutting, shaping, punching, and compressing metals.

3044. G. Smith, Phœnix Chemical Works, Cobden-street, Stewart's-lane, Battersea—Certain imp. in obtaining colouring matter.

3045. W. Dobson, Nottingham—Imp. in apparatus used in dressing lace or other fabrics.

3046. C. Socin, 2, Thavies-inn, Holborn—Imp. in looms for weaving ribbons.

3049. J. Faulding, 340, Euston-road—Imp. in locomotive engines.

3051. Admiral J. A. Duntze, Woolwich-common—Improved apparatus for communicating rotary motion to shafts or axles for various purposes. (A com.)

Dated 13*th November*, 1862.

3054. G. W. Rendel, Newcastle-on-Tyne—An improved method of strengthening and hardening cannon made wholly or partially of carbonised iron or steel, or the barrels or other parts thereof.

Dated 14*th November*, 1862.

3068. W. H. Andrew, Sheffield—An imp. in scissors and shears.

Dated 15*th November*, 1862.

3084. F. Palmer, Northumberland-street, Strand—Imp. in projectiles.

Dated 17*th November*, 1862.

3086. F. Rhales, Albert-street, Camden-road—Imp. in envelopes, with the view to affording better security thereby.

3088. D. Thomson, Grosvenor-road—Imp. in screw cocks.

Dated 18*th November*, 1862.

3100. N. Thompson, 15, Abbey-garden, St. John's-wood—Imp. in apparatus for stopping bottles, jars, and other vessels.

3102. J. Oxley, Frome, Somersetshire—Imp. in apparatus for separating liquids from substances.

Dated 19*th November*, 1862.

3014. H. J. F. Marmet, 4, South-street, Finsbury—Some imp. in the construction of lamps.

3106. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel.

3108. J. Arbos, Barcelona—Imp. in generating certain gases for obtaining motive power, and in the apparatus employed therein.

3110. C. Kilner, 2, Grove-cottages, Albion-grove, Islington, and G. Kilner, W. Kilner, and J. Kilner, Thornhill Lees, near Dewsbury, Yorkshire—Imp. in means or apparatus for the manufacture of glass.

3112. R. Hardman, Bolton-le-Moors — Certain imp. in looms for weaving.

Dated 20*th November*, 1862.

3116. C. Stevens, 31, Charing-cross - An improved brick-making machine. (A com.)

3118. F. Fletcher, Birmingham—Imp. in the arrangement of a vessel or vessels for the compression of air as applicable to lift or force pumps.

3122. R. B. Seeley, Mortlake, Surrey—Imp. in inkstands.

3124. W. Bottomley, Bramley, Leeds—Imp. in machinery for stiffening woollen and other fabrics.

Patents Sealed.

[*From Gazette, November* 28*th*, 1862.]

November 28*th*.

1625. P. U. Pyras.
1648. T. T. Lawden.
1657. A. J. Sax.
1661. J. Key and F. Potts.
1673. J. Biers.
1674. S. Weston.
1675. J. L. Norton.
1676. J. Fincham.
1677. A. H. Perry.
1680. W. James.
1683. G. Allibon and E. Snell.
1684. G. B. Toselli.
1688. E. Scheutz.
1692. G. Rydill.
1719. J. M. Ryo-Catteau.
1723. A. Knowles.
1732. J. B. Ingle.
2020. S. Partridge.
2043. M. Kurts.
2078. S. Lord and J. Lord.
2395. H. Jones.
2656. G. Haseltine.

[*From Gazette, December* 2*nd*, 1862.]

December 2*nd*.

1681. T. Alcock.
1694. J. Bell.
1696. J. M. Stanley & J. Stanley.
1703. W. E. Newton.
1707. W. R. Jeune.
1710. A. J. Adams.
1711. G. D. Hatton.
1713. C. Hook.
1718. J. Keeling.
1748. F. Tolhausen.
1776. R. Hicks.
1786. A. Crestadoro.
1794. W. Clark.
1796. J. Kellow and H. Short.
1805. A. Howat.
1875. T. R. Tebbutt.
2186. W. E. Newton.
2628. J. Milner, R. D. Milner, and F. Hurd.
2677. T. Greenwood.
2717. T. Ratcliffe.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, December* 2*nd*, 1862.]

November 25*th*.

2673. G. E. Donisthorpe
2676. L. J. Vandecasteele.
2677. C. Bedells.
2706. B. Samuelson and W. Manwaring.
2713. G. J. Firmin.
2859. D. J. Fleetwood.

November 26*th*.

2694. R. A. Brooman.

November 29*th*.

2720. J. Cocks.
2723. J. Paton.

Patents on which the Stamp Duty of £100 has been Paid.

[*From Gazette, December* 2*nd*, 1862.]

November 25*th*.

2705. E. J. Davis.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No.	Date of Registration.	Title.	Name.	Address.
4525	Nov. 18	A Paté Holder...	Blumberg and Company ...	Carman-street West, E.C.
526	,, ,,	Improved Shoe Sole Cutter	William Reaney	Bernard Works, Sheffield.
527	,, 27	Lantern	Hodge and Reed	100 and 101, Hatton-garden, E.C.